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ANALYSIS OF-THE-ART HEAT WORK OPTIMIZATION FOR FLAMING FURNACES OF CHAMBER TYPE

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An analysis of modern condition for mathematical optimization task of heat work for heating furnaces of chamber type is carried out. The complications in the system «heating gases - refractory of furnace - metal», related with providing of heat energy admission even to the surface of the heated metal are marked. By the decision of such problem may to be an improvement of heat charts for heating furnaces of mentioned type, and also methods of gaseous fuel incineration, in particular, and as one of its variants is incineration of fuel in the phase mode.

Keywords: heating furnaces of chamber type, metal, evenness of heating, tasks of mathematical optimization, modern condition, analysis

Heating furnaces of chamber type serve as the main consumers of power resources in metallurgical and machine-building industries of industry. In the noted thermal aggregates widely use recirculation of gas streams [1], and also combining of mixture of a few components of fuel [2], thus temperature conditions set not only from position of providing of the set temperature of surface of metal and evenness of its distribution (coming from thermal massiveness), and also taking into account thermophysical transformations to the metal during its heating and heat treatment.

During work of flaming furnaces of chamber type there are complications, related to providing of the even tricking into of warmth to the surface of metal, id est. the process of smoothing in him of temperature takes place, when the value of thermal stream diminishes continuously, that conditioned by the necessity of support of stationary temperature of surface of metal at set level. To the end of period of heating of metal during the decline of total expense of the furnace gases and, as a result, and rates over of their movement, the value of total coefficient for heat transfer which brings to complication of metal heating process organization diminishes.

The accounts of dependence of thermophysical parameters of metal from a temperature carry out the method of progressive approximations. The noted method is used during the decision of the constrained tasks of heat exchange in the swept volume of furnaces [3], where the detailed information is not needed about the field of temperature, but important is speed of calculations.

In a publication [4] the optimal is given on the cost of mixture of gaseous fuel mode of heating with the use of two her components. It is set that components of fuel it follows to choose coming from the degrees of temperature condition, and also the task of choice of calorific property of gaseous fuel is decided.

In works [5,6] the optimal modes of operations of flaming chamber furnaces are certain after economic criteria, in-process [7] the management of them is considered by thermal work from position of providing of the set exactness of

heating.

In-process [8] the mathematical model of optimization of regime parameters of flaming chamber furnace is offered as a decision of task of heat exchange in the system «the furnace gases – laying – metal».

For raising of tasks of mathematical optimization of heating of metal of provide of different sort of limitation both on influences which manage and on the co-ordinates of object as a row of inequalities. Mostly limit the value of speed metal heating (cooling), both from position of diminishing of internal tensions and treason of crystallization transformations [9].

During optimization of control heating in furnaces quite often impose restriction not only on thermal power but also on quality of incineration of fuel. It is known that the presence of oxygen in the work volume of furnace results in waste metal due to the processes of oxidation and decarbonating. It is experimentally set that conditioning for such processes the not so much concentration of oxygen, many time of stay of metal, serves in a stove at the increased temperature. Limits enter also on the maximal and minimum thermal loading taking into account the productivity of furnace, as gas-burners, their range of adjusting, and also carrying capacity of gas-freeing highway.

During the control of flaming furnaces of chamber type of expense of gaseous fuel thermal power accompanied by diminishing of quantity of products of burning, and, thus and by volume expense of the furnace gases which participate in a heat exchange. It results in complication of organization of heating process, as a management must be carried out in relation to areas gardens of metal, which are most heated, and the gardens of metal determine the productivity of thermal aggregate backward areas.

Therefore a control by thermal work of furnaces of the noted type consists in organization of purposeful influence on heat-exchange processes which take place in the system «the stove gases are laying – metal». The transferrableness of warmth from the furnace gases to the metal, which heat, is carried out due to an external heat exchange, which is determined by both the temperature of the furnace gases and rate of their movement. During the rev-up of motion of gases there is smoothing of the field of temperature in the transversal cut of stream which is tantamount to the increase of their temperature [2] but, as a result, a control by thermal work of furnaces of this type is taken to the control by an external heat exchange by treason of the thermal loading of furnace.

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